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SUBJECT: BEIJING'S OLYMPICS AIR QUALITY IMPROVEMENTS TEMPORARY

REF: A. 2008 Beijing 1516; B. 2008 Beijing 2966; C. Beijing 1945

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SUMMARY

¶1. (SBU) The results of a Cornell University-led study on air quality control measures imposed by the Chinese government during the 2008 Olympics in Beijing show that local controls in Beijing succeeded in only temporarily improving air quality. Although the measures reduced certain pollutants, it also changed the air chemistry which allowed other pollutants such as Ozone to form. The weather played an especially significant role, with wind blowing in from industrial regions outside of Beijing being responsible for most of the pollution on bad air days. Data from the researchers' monitor, located 7km away from the Embassy, also tracked closely with that of the US Embassy monitor, validating the accuracy of the Embassy's data and suggesting that the Embassy's readings are representative of Beijing's overall air quality. Despite Beijing's efforts in preparation for the Olympics, pollution levels in Beijing still frequently reach the "hazardous" level, which may be exacerbated by the greater use of coal due to the unusually cold winter and natural gas shortages. End Summary.

Background

¶2. (SBU) A recent study shed new light on China's efforts to improve air quality for the Beijing Olympics. The study "PM and the Beijing Olympics: Controls succeed when helped by the weather," was led by Dane Westerdahl, Xing Wan and Max Zhang of Cornell University, in collaboration with Ye Wu and Jiming Hao of Tsinghua University and Xiaochuan Pan from the Peking University School of Public Health. Researchers established a fixed community-monitoring station at the Peking University Health Center, located on Beijing's northwest fourth ring road. The team also conducted on-road assessments of emissions from trucks and buses and near-roadway monitoring to assess the impact of local traffic controls before, during, and after the Olympics (summer 2007, 2008, and early winter 2009). In addition to looking at the pollutants of concern to Chinese authorities (PM10, sulfur dioxide, and carbon monoxide), the monitoring equipment used in the study also measured PM2.5 and black carbon concentrations.

¶3. (U) In formalizing its selection as the host of the 2008

Olympics, China promised the International Olympic Committee (IOC) that it would meet international health guidelines for PM10, carbon monoxide (CO) and sulfur dioxide (SO2). To honor this commitment, the Beijing authorities imposed extensive pollution controls in Beijing and the surrounding region (Refs. A, B). Driving restrictions received the most attention. According to HE Kebin, a professor at Tsinghua University's Department of Environmental Science and Engineering Department, vehicle use causes 50 percent of the particulate pollution in Beijing. Before the Olympics, only trucks over three tons were prohibited from entering the central city, and other trucks were only permitted in the city from midnight until 6am. More stringent traffic control measures were gradually imposed beginning in July 2008 and continued through September 2008(Refs. A, B).

Traffic Controls and Black Carbon

¶4. (SBU) Research results clearly showed the positive impact of the truck ban. When large trucks could enter the city after midnight, black carbon measurements spiked, with maximum concentrations measuring up to 30ug/m3 in both 2007 and 2008. Once the restrictions banning high-polluting and non-local trucks from entering the city took effect, the after-midnight spike in black carbon disappeared and the concentrations averaged 3.65ug/m3. These measurements confirmed that diesel trucks are a main contributor to black carbon levels in Beijing.

Surprising Effects on Air Chemistry

¶5. (SBU) The researchers found that while the various pollution

control measures did reduce PM10 levels in Beijing, it also had the unintended consequence of changing the chemistry of the air which may have resulted in increased ozone formation. [NOTE: The Embassy has installed an Ozone monitor and will start to release readings in February 2010. END NOTE] The researchers felt that Beijing was too focused on meeting the IOC's rules on PM10 levels, and instead should have focused on reducing PM2.5 levels to improve both health and visibility.

¶6. (SBU) While vehicle emission controls appeared to be effective in reducing black carbon levels, researchers also found a correlation between PM2.5, black carbon and poor visibility. On days with high levels of PM2.5 (polluted days), the levels of black carbon tracked directly with PM2.5 and visibility was poor. However, on days with low PM2.5 levels (clean days), there was not as strong a correlation to lower levels of black carbon, and visibility was good. The researchers noted that as black carbon is also a carcinogen and a significant contributor to global warming, reducing this pollutant would have multiple beneficial environmental effects.

Successful Control Dependent on Weather

¶7. (SBU) Despite the various traffic and industry controls (Refs. A, B), air pollution remained a problem on several days during the Olympics. Pollutant levels of PM2.5 during the Olympics varied widely from 9.8 ("Good" using EPA standards) to over 210ug/m3 ("Very Unhealthy"). Researchers noted that on days of poor air quality, the wind blew in from the Tianjin industrial area southeast of Beijing, and on clean air days the wind direction was from the north or west - blowing away from Tianjin. Therefore, the researchers concluded, pollution controls enacted only in Beijing were doomed to limited success because of the need to have a more regional approach (Ref. B).

Study validates US Embassy monitor

¶8. (SBU) The China Daily has reported several times on the Embassy's PM2.5 monitor, but is careful to use cautionary statements pointing out that the monitor is in a "high traffic area in the

central business district" or located in "Beijing's car-populated business area," suggesting that the monitor data is not representative of Beijing's overall air quality. This study, however, refutes this assertion. From July 21, 2008, to August 20 2008, the readings from the researchers' PM2.5 monitor - located 7km away from the Embassy - were nearly identical to those from the US Embassy monitor. This suggests that the readings from the US Embassy monitor are actually representative of Beijing's air quality as a whole.

Air Quality Still Bad

¶9. (SBU) Nearly a year-and-a-half following the Olympics, Beijing's air quality has not significantly improved. With construction continuing, trucks allowed into the city after midnight and the only private vehicle control being a driving restriction on only one day during the work week, the air is still consistently unhealthy. For example, from November 9 through December 10 of 2009, the Air Quality Index, as measured by the Embassy's PM2.5 monitor, registered 18 days of "Hazardous" air, which, according to the EPA, is a level normally seen during forest fires.

¶10. (SBU) In addition, the early and unusually cold winter is exacerbating Beijing's pollution problems. In order to make up for the energy shortfall as a result of a natural gas shortage, coal use for heating and in industrial areas has increased. As the study suggests, the pollutants from this additional coal burning explains in part why Beijing's air quality in November and December was particularly poor.

Conclusion

¶11. (SBU) During the Olympics, local pollution control measures were genuinely effective in reducing PM and CO levels, but only when the weather was not blowing pollution in from the industrial regions Southeast of Beijing. Clearly, any effective and sustainable effort

at reducing Beijing's pollution will require a regional response. The work of these researchers suggests that the technology to control black carbon emissions is currently available and a strong argument could be made that the dissemination and use of this technology would make a significant contribution to China's overall strategy for controlling pollutant and greenhouse gas emissions, as well as improve visibility in China's most polluted cities.

HUNTSMAN